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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/591,070

08/30/2006

Noriyoshi Tsuyuzaki

OKB-017

5909

20374 7590 08/17/2011

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EXAMINER

YANG, JAMES J

ART UNIT

PAPER NUMBER

2612

MAIL DATE

DELIVERY MODE

08/17/2011

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/591,070	Applicant(s) TSUYUZAKI, NORIYOSHI
	Examiner JAMES YANG	Art Unit 2612

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06/20/2011.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4, 6, 8-11, 13 and 15-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6, 8-11, 13, 15-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This Office Action is in response to applicant's amendment and request for continued examination filed 06/20/2011. Claims 1-4, 6, 8-11, 13, and 15-19 are currently pending in this application.

Claim Objections

Claims 1-4, 6, 8-11, 13, and 15-19 are objected to because of the following informalities:

Claims 1, 9, and 18 recite "wherein the pulse interval of the random pulses is measured using clock pulses", and should be changed to --wherein the **random** pulse interval of the random pulses is measured using clock pulses-- for consistency. Claims 2-4, 6, 8, 10-11, 13, 15-17, and 19 are further objected to based on their dependency on claims 1, 9, or 18.

Appropriate correction is required.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 18-19 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claims 18-19 are drawn to a computer readable memory medium storing an authentication program. The applicant's

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specification, for example Paragraphs [0057-0058], do not exclude the computer readable memory medium from propagating signals or other transitory mediums, and is therefore non-statutory. A claim drawn to such a computer readable medium that covers both transitory and non-transitory embodiments may be amended to narrow the claim to cover only statutory embodiments by adding the limitation "non-transitory" and/or "tangible" to avoid a rejection under 35 U.S.C. 101. See 1351 OG 212.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-4, 8-11, and 15-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shi (EP 0957220) in view of Shilton (WO 99/41834).

Claim 1, Shi teaches:

An authentication apparatus comprising

a body, and a partner side paired with the body (Shi, Paragraph [0008], The lock body is a body, and the key-body is a partner side.), the apparatus comprising:

a random pulse generator, arranged in the body or the partner side, or in both the body and the partner side (Shi, Fig. 3, The oscillator is a random pulse generator, and is located within the random number generator IC3, which is part of the

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body side.), **which generates random pulses** (Shi, Paragraph [0016], The oscillator produces oscillations at a random frequency, i.e. random pulses.);

a means which outputs authentication data (Shi, Paragraph [0012], Random code generator IC3 is a means which outputs authentication data based on the circuit in Fig. 3.) **based on both a random pulse voltage** (Shi, Paragraph [0017], A true random code is partially created from a voltage-controlled oscillator to obtain a spectrum-spread signal. The inputs used to generate the output at the VCO are converted into levels based on a pseudo-random rule, hence is a random pulse voltage. Although the generation of the output of the D/A converter is based on a pseudo-random rule, the output of the D/A converter itself is random.) **and a random pulse interval of the random pulses generated by the random pulse generator** (Shi, Paragraphs [0016-0017], The output of oscillator A, which is the random pulse generator, is used to generate the input of the VCO. Therefore, both the random pulse interval of the random pulses generated by the random pulse generator and the random pulse voltages are used to generate the true random number, which is later used to generate authentication data.);

a means which stores authentication data (Shi, Paragraph [0006]),

a communication means which transmits/receives authentication data (Shi, Paragraph [0008]); and

a control means which controls the communication of authentication data and collates authentication data (Shi, Paragraph [0009], Microprocessor IC1 is the control means, and the comparison between the codes stored in the lock-body and the

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key-body is the collation of the authentication data.), **wherein the random pulse interval of the random pulses is measured using clock pulses** (Shi, Paragraph [0016], The oscillator outputs at a random frequency and is sampled by an independent clock pulse. Since the oscillator has a random frequency, i.e. a pulse interval, the pulse interval is measured using clock pulses.) **and said authentication data is outputted based on a combination of the random pulse voltage of the random pulses** (Shi, Paragraph [0017], A true random code is partially created from a voltage-controlled oscillator to obtain a spectrum-spreaded signal. The inputs used to generate the output at the VCO are converted into levels based on a pseudo-random rule, hence is a random pulse voltage. Although the generation of the output of the D/A converter is based on a pseudo-random rule, the output of the D/A converter itself is random. Since the input to the VCO was originally generated by the random pulse generator, the random pulse voltage is of the random pulses.) **and a number of the clock pulses acquired by measuring the random pulse interval of the random pulses** (Shi, Paragraphs [0016-0017], The sampling of the random oscillator over independent clock pulse series is a number of clock pulses acquired. This sampling is received by the m-sequence generator, followed by the D/A converter, and is used by the VCO to eventually output a random number.).

Shi does not teach:

The random pulse generator detects α particles, a beta ray or a gamma ray released by the collapse of an atomic nucleus and generates the random pulses.

Shilton teaches:

The random pulse generator detects the α particles, the beta ray or the gamma ray released by the collapse of the atomic nucleus (Shilton, Page 5, Lines 18-20, The radiation is detected by a PIN diode (see Shilton, Page 5, Lines 30-31) or directly onto a silicon chip (see Shilton, Page 6, Lines 1-2). The radioactive decay is the collapse of the atomic nucleus.) **and generates random pulses** (Shilton, Page 4, Lines 13-15).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the random code generator in Shi by integrating the low radiation source and detector for generating random events as taught by Shilton.

The motivation would be to produce random codes that are difficult to duplicate to prevent fraud or corruption of random pulse generators (see Shilton, Page 1, Lines 9-18).

Claim 2, Shi in view of Shilton further teaches:

The control means receives authentication data stored in the storage means arranged on the partner side, collates the received authentication data with authentication data of the storage means arranged in the body (Shi, Paragraph [0009], Microprocessor IC1 is the control means, and the comparison between the codes stored in the lock-body and the key-body is the collation of the authentication data.), **and in accordance with the result of collation, authenticates the partner side** (Shi, Paragraph [0009]), **and in that upon completion of the authentication, authentication data is updated, and new authentication data thus**

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updated is written in the storage means of the body and the partner side (Shi, Paragraph [0009]).

Claim 3, Shi in view of Shilton further teaches:

A drive unit control means which controls a drive unit in accordance with the result of collation by the control means (Shi, Paragraph [0009], The driving mechanism, represented by an output drive IC5, is a drive unit control means, which controls the lock of a lock-body, which is a drive unit.).

Claim 4, Shi in view of Shilton further teaches:

The body is the body of an electronic lock, and the partner side is a key (Shi, Paragraph [0008], The lock-body comprises a microprocessor, memory, random code generator, driver, and alarm unit, thus it is an electronic lock.).

Claim 8, Shi in view of Shilton further teaches:

The communication means transmits/receives the authentication data by circuit connection due to contact or by infrared light communication or radio communication (Shi, Paragraph [0008]).

Claim 9, Shi teaches:

An authentication method comprising the steps of:

generating random pulses by a random pulse generator (Shi, Paragraph [0016], The oscillator produces oscillations at a random frequency, i.e. random pulses.)
arranged in a body or a partner side paired with the body, or in both the body and the partner side (Shi, Fig. 3, The oscillator is a random pulse generator, and is located within the random number generator IC3, which is part of the body side.);

outputting authentication data (Shi, Paragraph [0012], Random code generator IC3 is a means which outputs authentication data based on the circuit in Fig. 3.) **based on both of a random pulse voltage** (Shi, Paragraph [0017], A true random code is partially created from a voltage-controlled oscillator to obtain a spectrum-spread signal. The inputs used to generate the output at the VCO are converted into levels based on a pseudo-random rule, hence is a random pulse voltage. Although the generation of the output of the D/A converter is based on a pseudo-random rule, the output of the D/A converter itself is random.) **and a random pulse interval of the random pulses generated by the random pulse generator** (Shi, Paragraphs [0016-0017], The output of oscillator A, which is the random pulse generator, is used to generate the input of the VCO. Therefore, both the random pulse interval of the random pulses generated by the random pulse generator and the random pulse voltages are used to generate the true random number, which is later used to generate authentication data.);

storing authentication data (Shi, Paragraph [0006]);

transmitting/receiving authentication data (Shi, Paragraph [0008]); **and**

controlling the communication of authentication data and collating authentication data (Shi, Paragraph [0009], Microprocessor IC1 is the control means, and the comparison between the codes stored in the lock-body and the key-body is the collation of the authentication data.), **wherein the pulse interval of the random pulses is measured using clock pulses** (Shi, Paragraph [0016], The oscillator outputs at a random frequency and is sampled by an independent clock pulse. Since the oscillator has a random frequency, i.e. a pulse interval, the pulse interval is measured using clock pulses.) **and said authentication data is outputted based on a combination of the random pulse voltage of the random pulses** (Shi, Paragraph [0017], A true random code is partially created from a voltage-controlled oscillator to obtain a spectrum-spread signal. The inputs used to generate the output at the VCO are converted into levels based on a pseudo-random rule, hence is a random pulse voltage. Although the generation of the output of the D/A converter is based on a pseudo-random rule, the output of the D/A converter itself is random. Since the input to the VCO was originally generated by the random pulse generator, the random pulse voltage is of the random pulses.) **and a number of the clock pulses acquired by measuring the pulse interval of the random pulses** (Shi, Paragraphs [0016-0017], The sampling of the random oscillator over independent clock pulse series is a number of clock pulses acquired. This sampling is received by the m-sequence generator, followed by the D/A converter, and is used by the VCO to eventually output a random number.).

Shi does not teach:

The random pulse generator detects the α particles, the beta ray or a gamma ray released by the collapse of an atomic nucleus and generates random pulses.

Shilton teaches:

The random pulse generator detects the α particles, the beta ray or the gamma ray released by the collapse of the atomic nucleus (Shilton, Page 5, Lines 18-20, The radiation is detected by a PIN diode (see Shilton, Page 5, Lines 30-31) or directly onto a silicon chip (see Shilton, Page 6, Lines 1-2).) **and generates random pulses** (Shilton, Page 4, Lines 13-15).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the random code generator in Shi by integrating the low radiation source and detector for generating random events as taught by Shilton.

The motivation would be to produce random codes that are difficult to duplicate to prevent fraud or corruption of random pulse generators (see Shilton, Page 1, Lines 9-18).

Claim 10, Shi in view of Shilton further teaches:

The control step receives the authentication data stored in a storage means arranged on the partner side, collates the received authentication data with authentication data of a storage means arranged in the body (Shi, Paragraph [0009], Microprocessor IC1 is the control means, and the comparison between the codes stored in the lock-body and the key-body is the collation of the authentication

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data.), **authenticates the partner side in accordance with the result of collation** (Shi, Paragraph [0009]), **and after completion of authentication, updates authentication data, and writes new authentication data thus updated in the storage means of the body and the partner side** (Shi, Paragraph [0009]).

Claim 11, Shi in view of Shilton further teaches:

A drive unit control step for controlling a drive unit in accordance with the result of collation in the control step (Shi, Paragraph [0009], The driving mechanism, represented by an output drive IC5, is a drive unit control means, which controls the lock of a lock-body, which is a drive unit.).

Claim 15, Shi in view of Shilton further teaches:

The communication step transmits and receives the authentication data by circuit connection due to contact or by infrared light communication or radio communication (Shi, Paragraph [0008]).

Claim 16, Shi in view of Shilton further teaches:

The body or the partner side includes the hardware of a computer (Shi, Paragraph [0012], The microprocessor IC1 and the non-volatile memory unit IC2 are hardware of a computer, and the body includes the hardware.), **and the partner side or the body including the random pulse generator is mounted integrally with or independently of the hardware of the computer** (Shi, Paragraph [0012], As further

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disclosed in Fig. 1, the true random generator IC3 is mounted integrally with the hardware of the computer components IC1 and IC2 within the lock-body.).

Claim 17, Shi in view of Shilton further teaches:

The body or the partner side includes the hardware of a computer (Shi, Paragraph [0012], The microprocessor IC1 and the non-volatile memory unit IC2 are hardware of a computer, and the body includes the hardware.), **and the partner side or the body including the random pulse generator is mounted integrally with or independently of the hardware of the computer** (Shi, Paragraph [0012], As further disclosed in Fig. 1, the true random generator IC3 is mounted integrally with the hardware of the computer components IC1 and IC2 within the lock-body.).

Claim 18, Shi teaches:

A computer readable memory medium storing an authentication program, said authentication program (Shi, Paragraph [0006], Shi discloses in Fig. 2 a flow chart showing the operation of the cryptogram lock system performed by the microprocessor IC1, non-volatile memory unit of the lock-body and key-body, random code generator IC3, output driver IC5, and alarm unit IC6, which is automatically performed. It is inherent of a system that automatically performs the steps disclosed in Fig. 2 and Paragraph [0020] that the steps, as a whole, are programmed into the microprocessor IC1 of the lock-body.) **comprising:**

a code to generate random pulses from a random pulse generator (Shi, Paragraph [0016], The oscillator produces oscillations at a random frequency, i.e. random pulses.) **arranged in a body or a partner side paired with the body, or in both the body and the partner side partner side** (Shi, Fig. 3, The oscillator is a random pulse generator, and is located within the random number generator IC3, which is part of the body side.);

a code to output authentication data (Shi, Paragraph [0012], Random code generator IC3 is a means which outputs authentication data based on the circuit in Fig. 3.) **based on both of a random pulse voltage** (Shi, Paragraph [0017], A true random code is partially created from a voltage-controlled oscillator to obtain a spectrum-spreaded signal. The inputs used to generate the output at the VCO are converted into levels based on a pseudo-random rule, hence is a random pulse voltage. Although the generation of the output of the D/A converter is based on a pseudo-random rule, the output of the D/A converter itself is random.) **and a random pulse interval of the random pulses generated by the random pulse generator** (Shi, Paragraphs [0016-0017], The output of oscillator A, which is the random pulse generator, is used to generate the input of the VCO. Therefore, both the random pulse interval of the random pulses generated by the random pulse generator and the random pulse voltages are used to generate the true random number, which is later used to generate authentication data.);

a code to store authentication data (Shi, Paragraph [0006]);

a code to transmit/receive authentication data (Shi, Paragraph [0008]); **and**

a code to control the communication of authentication data and collate authentication data (Shi, Paragraph [0009], Microprocessor IC1 is the control means, and the comparison between the codes stored in the lock-body and the key-body is the collation of the authentication data.), **wherein the pulse interval of the random pulses is measured using clock pulses** (Shi, Paragraph [0016], The oscillator outputs at a random frequency and is sampled by an independent clock pulse. Since the oscillator has a random frequency, i.e. a pulse interval, the pulse interval is measured using clock pulses.) **and said authentication data is outputted based on a combination of the random pulse voltage of the random pulses** (Shi, Paragraph [0017], A true random code is partially created from a voltage-controlled oscillator to obtain a spectrum-spread signal. The inputs used to generate the output at the VCO are converted into levels based on a pseudo-random rule, hence is a random pulse voltage. Although the generation of the output of the D/A converter is based on a pseudo-random rule, the output of the D/A converter itself is random. Since the input to the VCO was originally generated by the random pulse generator, the random pulse voltage is of the random pulses.) **and a number of the clock pulses acquired by measuring the pulse interval of the random pulses** (Shi, Paragraphs [0016-0017], The sampling of the random oscillator over independent clock pulse series is a number of clock pulses acquired. This sampling is received by the m-sequence generator, followed by the D/A converter, and is used by the VCO to eventually output a random number.).

Shi does not teach:

The random pulse generator detects α particles, a beta ray or a gamma ray released by the collapse of an atomic nucleus and generates the random pulses.

Shilton teaches:

The random pulse generator detects the α particles, the beta ray or the gamma ray released by the collapse of the atomic nucleus (Shilton, Page 5, Lines 18-20, The radiation is detected by a PIN diode (see Shilton, Page 5, Lines 30-31) or directly onto a silicon chip (see Shilton, Page 6, Lines 1-2). The radioactive decay is the collapse of the atomic nucleus.) **and generates random pulses** (Shilton, Page 4, Lines 13-15).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the random code generator in Shi by integrating the low radiation source and detector for generating random events as taught by Shilton.

The motivation would be to produce random codes that are difficult to duplicate to prevent fraud or corruption of random pulse generators (see Shilton, Page 1, Lines 9-18).

Claim 19, Shi in view of Shilton further teaches:

The code to control the communication of authentication data and collate authentication data includes: a code to receive authentication data stored in a storage means arranged on the partner side (Shi, Paragraph [0009], The memory of the IC4 of the key-body is the storage means arranged on the partner side.); **a code to collate the received authentication data with authentication data of a storage**

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means arranged in the body (Shi, Paragraph [0009], Microprocessor IC1 is the control means, and the comparison between the codes stored in the lock-body and the key-body is the collation of the authentication data.); **a code to authenticate the partner side in accordance with the result of collation** (Shi, Paragraph [0009]); **a code to update authentication data after completion of the authentication** (Shi, Paragraph [0009]); **and a code to write new authentication data thus updated in the storage means of the body and the partner side** (Shi, Paragraph [0009]).

2. Claims 6 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shi (EP 0957220) in view of Shilton (WO 99/41834), and further in view of Barker (U.S. 5,076,971).

Claims 6 and 13, Shi in view of Shilton teach:

An α particle radiator includes ^{241}Am , ^{210}Pb - ^{210}Po , ^{210}Po , and/or ^{244}Cm
(Shilton, Page 5, Lines 21-25).

Shi in view of Shilton teach:

A beta ray radiator includes ^{210}Pb .

Barker teaches:

A beta ray radiator includes ^{210}Pb (Barker, Col. 9, Lines 9-11).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the radiation source in Shi in view of Shilton with a ^{210}Pb beta emitter as taught by Barker.

The motivation would be to provide a stable beta radiation source with a long half-life (see Barker, Col. 2, Lines 6-16) applicable as a low activity radiation source in a Random Pulse Generator (see Shilton, Page 5, Lines 18-30).

Response to Arguments

Applicant's arguments filed 06/20/2011 have been fully considered but they are not persuasive.

In response to the applicant's argument on Page 10 regarding the Shi reference not teaching the feature of "said authentication data is outputted based on a combination of the random pulse voltage of the random pulses and a number of the clock pulses acquired by measuring the random pulse interval of the random pulses", the examiner disagrees with respect to the rejection above, and is further explained. The random pulses are interpreted as the output of the oscillator A (see Shi, Paragraph [0016]), because the oscillator outputs at a random oscillating frequency, i.e. random pulses. As seen in Fig. 3 of Shi, the output of the oscillator A enters M-sequence generator B, then a D/A converter, and then a voltage controlled oscillator C. The output of the oscillator A eventually becomes the control to the VCO, and hence a random pulse voltage corresponding to the random pulses generated by the random pulse generator. Further, because a clock pulse series is used to sample data from the oscillator A, the data sampled from the oscillator is a number of the clock pulses that is acquired by measuring the random pulse interval of the random pulses. In other words, if only a single sample is used, for example, then the number of clock pulses is the

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corresponding data sampled at that clock pulse, since it is acquired by measuring the random pulse interval of the random pulses. It is noted that the claims, as written, allow for multiple interpretations. The end product of Fig. 3 is a "True random code", which is used as an authentication data, and is thus a result of a combination of both the random pulse voltage and the number of the clock pulses.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JAMES YANG whose telephone number is (571)270-5170. The examiner can normally be reached on M-F 8:30-5 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Zimmerman can be reached on 571-272-3059. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. Y./

/Brian A Zimmerman/
Supervisory Patent Examiner, Art Unit 2612